

5 What is claimed is:

1.
 2.
 3.
 4.
 5.
 6.
 7.
 8.
 9.
 10.
 11.
 12.
 13.
 14.
 15.
 16.
 17.
 18.
 19.
 20.
 21.
 22.
 23.
 24.
 25.
 26.
 27.
 28.
 29.
 30.
 31.
 32.
 33.
 34.
 35.
 36.
 37.
 38.
 39.
 40.
 41.
 42.
 43.
 44.
 45.
 46.
 47.
 48.
 49.
 50.
 51.
 52.
 53.
 54.
 55.
 56.
 57.
 58.
 59.
 60.
 61.
 62.
 63.
 64.
 65.
 66.
 67.
 68.
 69.
 70.
 71.
 72.
 73.
 74.
 75.
 76.
 77.
 78.
 79.
 80.
 81.
 82.
 83.
 84.
 85.
 86.
 87.
 88.
 89.
 90.
 91.
 92.
 93.
 94.
 95.
 96.
 97.
 98.
 99.
 100.

1. A tissue type recognition system for determining a type of unknown tissue

comprising :

a tip;

a shaft for coupling said tip to a handle;

a plurality of electrodes in said tip;

tissue recognizing circuitry electrically coupled to said plurality of electrodes;

wherein said circuitry injects electrical current into said tissue via said electrodes for measuring at least two unique electrical properties of said tissue; and,

each of said electrical properties is compared with corresponding electrical properties of known tissue types to determine said type of unknown tissue.

2. The tissue type recognition system of claim 1 wherein said electrodes are used in pairs to measure a pulse response of said tissue.

3. The tissue type recognition system of claim 1 wherein each of said plurality of electrodes are used to perform a terminal conductivity measurement.

4. The tissue type recognition system of claim 1 wherein contact between said electrodes and said tissue is checked by making measurements on adjacent pairs of said plurality of electrodes.

5. The tissue type recognition system of claim 1 wherein said current is between 0 and 10 milliamps applied at a frequency of at least 100kHz.

-17-

- 5 *Sub
A0* 6. The tissue type recognition system of claim 1 further comprising the
step of using
discriminant analysis when data for different known tissue types is difficult to
separate.
- 10 7. The tissue type recognition system of claim 1 further comprising a
method for
detecting the presence of abnormal tissue in a cervix comprising the steps of:
measuring an electrical conductivity of cervical tissue in said cervix via
a first pair of said electrodes;
15 measuring a pulse and decay property of said cervical tissue in said
cervix via a second pair of said electrodes; and,
combining said conductivity and said pulse and decay properties to
differentiate between normal and abnormal cervical tissue.
- 20 8. The tissue type recognition system of claim 1 wherein the tip further
comprises a
large electrode.
- 25 9. The tissue type recognition system of claim 1 wherein said electrodes
are arranged
in a number of rows.
- 30 10. The tissue type recognition system of claim 9 further comprising a
method for
scanning a canal wall electronically by employing electrodes in turn so that
appropriate pairs of electrodes are energized thereby simulating movement of
one pair of electrodes in a circular scanning motion along said canal wall.
- 35 11. The tissue type recognition system of claim 1 wherein the tissue
recognizing

-18-

5 ~~50~~ circuitry further comprises means for measuring a pulse response of said tissue,
an electrical resistance of said tissue, a reactance of said tissue, and a potential
difference of said tissue.


10 12. The tissue type recognition system of claim 11 wherein the means for
measuring a
pulse response of said tissue further comprises a method including the steps of:
applying a pulse across a pair of said electrodes; and,
measuring a decay of said pulse across said pair of electrodes.

15 13. The tissue type recognition system of claim 11 wherein the means for
measuring a
reactance of said tissue further comprises a method including the steps of:
measuring a first phase angle of voltage across a resistor in said tissue
recognizing circuitry electrically coupled to said tissue via a pair of said
20 electrodes;
measuring a second phase angle of voltage across said pair of
electrodes;
comparing said first and said second phase angles to yield data on the
reactive part of the tissue impedance.

25 14. The tissue type recognition system of claim 11 wherein the means for
measuring a
potential difference of said tissue further comprises a method including the
steps of:
30 injecting current into said tissue via a pair of said electrodes;
discontinuing said current; and,
raising a gain of a programmable gain amplifier connected to said pair
of electrodes.

35 15. The tissue type recognition system of claim 1 wherein said electrodes
are

-19-

- 5  configured with an outer pair and an inner pair, said outer pair being larger than said inner pair so that a homogeneity of an electrical field seen by said inner pair is thereby improved.

09807097 040501

